Environmental assessment of coloured fabrics and opportunities for value creation: spin-dyeing versus conventional dyeing of modal fabrics

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Textile wet processing such as dyeing adds value to the apparel but has the potential to cause significant environmental and human health impacts. The environmental impact of dyeing and finishing processes is gaining increasing attention. New cleaner technologies are being sought for all fibre types. The dyeing of fabrics based on cellulosic materials is a significant consumer of water, chemicals and energy. The objective of this study is to compare the environmental impacts of fabrics made of spun dyed modal with conventionally dyed modal fabrics (for production in Austria using the system "cradle-to-factory gate"). Modal is a cellulosic fibre manufactured by Lenzing AG in Austria but the results are also applicable to a comparison of spun dyed viscose in comparison with conventionally dyed materials.

The chosen functional unit is one kilogram of black modal knitted fabric. We assessed energy use, greenhouse gas emission, water use and the impact categories covered by CMI 2001 method for Life Cycle Analysis.

We found that the cradle to gate production of spun dyed modal fabric has 50% lower energy and water use together with 60% lower carbon footprint. It also has 40-60% lower environmental impacts compared to conventionally dyed fabrics.

Spin dyeing can significantly reduce costs for fabric production and help to reduce the environmental footprint of the end products and thus help to enhance the reputation of brands and retailers. It can therefore also help to mitigate global problems whilst catering for the rising demand for clothing fuelled by the ever growing world population.

Keywords: